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JACK-PINE BUDWORM

Huron National Forest, Michigan

1951

TIMBER DRAIN SURVEY

By
Daniel M. Benjamin

Forest Insect Laboratory
Milwaukee, Wisconsin
March 6, 1952

SUBJECT—

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UNITED STATES DEPARTMENT OF AGRICULTURE
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Division of Forest Insect Investigations

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JACK-PINE BUDWORM

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TIMBER DRAIN SURVEY

Introduction

The jack-pine budworm, Choristoneura sp., has been in outbreak in localized areas of Michigan for the past three years. During this period, severe defoliation of jack pine has occurred on the Huron National Forest and on the Au Sable, Higgins Lake, and Ogemaw State Forests on the lower peninsula, and on the Rapid River Ranger District on the Hiawatha National Forest on the upper peninsula. Surveys to determine the extent and severity of defoliation on the foregoing forests in 1950 and 1951 have been summarized in separate reports (2, 3). It is the purpose of this report to present the results of a survey designed to reveal the losses attributable to the current budworm outbreak on the Huron National Forest.

The jack-pine budworm, a biological variety of the spruce budworm, Choristoneura fumiferana (Clem.), was initially mentioned as an enemy of jack pine by Graham (5) in 1925 when he observed it defoliating jack pine in Minnesota. Apparently this was the first record of the budworm attacking jack pine and the first observed instance of its being in outbreak. Since, outbreaks of the budworm have occurred periodically in Michigan, Minnesota and Wisconsin. Losses in pole-size jack pine and among understory jack, red and white pine often have been severe. In Minnesota, for example, 50,000 to 75,000 cords of pole-size jack pine were reported dead or dying in the outbreak which occurred during the mid 1930's (4, 6). In Michigan, estimates of losses as high as 50 percent of the total stand were reported during the budworm outbreak of the mid 1930's (1). In addition, severe losses were sustained among the sapling and reproduction classes of jack, red, and white pine.

Losses sustained during the current jack-pine budworm outbreak have not been severe in pole stands. However, rather severe losses among understory saplings and reproduction have occurred. To determine the magnitude of these losses the Milwaukee Forest Insect Laboratory, in cooperation with the United States Forest Service, conducted a timber drain survey of the budworm-infested jack pine areas on the Huron National Forest in 1951. The objectives of this survey were: 1. to determine the accumulative current losses in the merchantable stand and in reproduction; and 2. to determine the losses following two seasons' defoliation of varying intensity; that is, the losses that occurred when a light, medium or heavy defoliation was followed by defoliation of the same or different intensity. The methods and results of this survey are herein reported.

Survey Methods

The plan of survey was developed by the United States Forest Service and the Milwaukee Forest Insect Laboratory to give results statistically accurate to 8 percent of the actual value of the total area involved. Information concerning the distribution and severity of budworm defoliation on the western third of the Huron National Forest was obtained from the 1950 and 1951 survey reports previously mentioned. Using these surveys as a basis, a series of areas were selected which had sustained known levels of budworm defoliation in two successive years. The areas selected for study were distributed so that plots occurred in every one of the 10 western townships of the Forest. Defoliation combinations selected are listed in Table 1; each defoliation combination was replicated as many times as possible within the survey period.

Table 1. Classification of Jack Pine Study Areas Based on Jack-Pine Budworm Defoliation in 1950 and 1951 Huron National Forest

Defoliation Classification 1950	Number of Plots Examined	Defoliation Classification 1951			
		None	Light	Medium	Heavy
None	8	—	3	2	3
Light	17	—	3	8	6
Medium	17	—	1	11	5
Heavy	—	—	—	—	—
Total	42				

The field work of the survey was conducted by cruising a series of 1/5-acre circular plots located one each at designated observation stations. Plots were established in jack pine type approximately 200 feet from the road right-of-way. Plot centers were tied to a convenient tree and the radii measured with a plastic rope. On each plot trees of pole size were tallied by species, 2-inch diameter class, and estimated number of 8-foot sticks to a 4-inch top on U. S. F. S. Cumulative 1/5-acre Tally Sheet (Form R-9, Rev. 6-17-47). Saplings were tallied by species in 2-inch diameter classes, and reproduction was tallied by species in one class. Each tree was classified further as either "HEALTHY-LIVING" or "DEAD-DYING" based on an estimate of its chances of survival. Those with full foliage or only partially defoliated were classified as HEALTHY-LIVING. Completely defoliated trees and those so severely defoliated that only a few needles remained which appeared insufficient to tide the tree over into another season were classified as DEAD-DYING.

In addition to the foregoing survey, seven 1/5-acre permanent study plots were established to evaluate the effects of budworm defoliations of numbered trees over a long period. It is the plan to examine these plots annually.

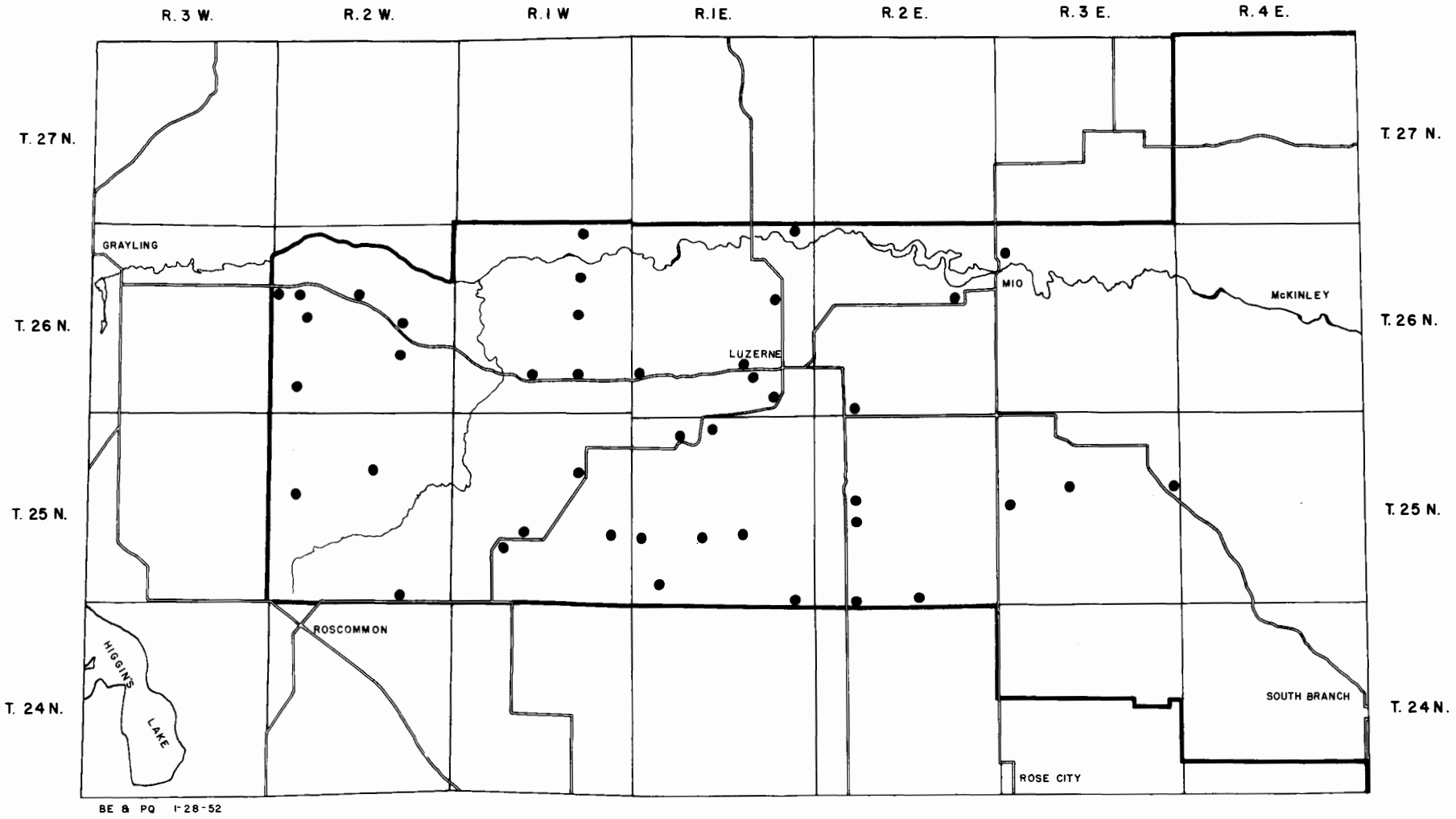
A two-man crew, consisting of Field Aids A. A. Prigge and H. O. Batzer, carried out the field work between August 27 and September 6. Compilation of field data required for the interpretation of the results of the survey was also done by this party.

Results

A total of forty-two 1/5-acre plots, the locations of which are shown in Figure 1, were examined during the survey. Average losses per defoliation classification are indicated and percentage losses are shown in Table 2. No areas classified as non-defoliated in 1950 and 1951 were included in this survey because of the general distribution of the budworm through the survey area. Losses among red and white pine were negligible and are not included in this summary.

Losses in merchantable pole-size jack pine attributable to the jack pine budworm defoliation averaged 0.2 cords per acre and ranged up to 0.7 cords per acre, representing an average loss of 3 percent of the available stocking. Mortality among 2-inch sapling pine caused by the budworm defoliation averaged 71 stems per acre and ranged from 20 to 180 stems per acre, representing an average loss of 33 percent. In the 4-inch sapling class, losses averaged 10 stems per acre, representing 8 percent of the stocking. Losses among reproduction averaged 30 stems per acre, and ranged from 2 to 62 stems per acre, representing a loss of from 1 to 42 percent.

It is apparently still too early to detect a correlation between the severity of two seasons' budworm defoliation and the magnitude of the losses in poles, sapling, and reproduction within the infestation area. However, serious losses have occurred among reproduction and advanced reproduction. How serious these losses will become depends greatly upon the path taken by the budworm outbreak in the next few seasons. Continued severe budworm defoliation will undoubtedly result in further losses in the smaller size classes and some mortality and top killing among pole-sized trees.



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Survey Plot ●

JACK-PINE BUDWORM

DAMAGE APPRAISAL SURVEY

Huron National Forest

1951

Table 2. Summary of Average Losses of Jack Pine in Areas Infested with Jack-pine Budworm - Huron National Forest - 1951

DEFOLIATION CLASSIFICATION 1950	1951	BASIS (No. of Plots)	POLES CORDS PER ACRE Live	Dead	Total	2-INCH SAPLINGS STEMS PER ACRE Live	Dead	Total	4-INCH SAPLINGS STEMS PER ACRE Live	Dead	Total	REPRODUCTION STEMS PER ACRE Live	Dead	Total
None	Light	3	9.9	0.2 2%	10.1	53	38 42%	91	75	10 12%	85	82	22 21%	104
None	Medium	2	2.0	0.0	2.0	165	20 11%	185	208	0	208	110	5 3%	115
None	Heavy	3	6.1	0.3 4%	6.4	53	30 34%	83	82	12 13%	94	398	52 12%	450
Light	Light	3	5.2	0.4 7%	5.6	128	57 31%	185	155	10 6%	165	165	62 27%	227
Light	Medium	8	9.5	0.2 1%	9.7	47	32 41%	79	54	18 25%	72	106	25 19%	131
Light	Heavy	6	7.3	0.1 2%	7.4	136	26 15%	162	100	4 4%	104	273	41 13%	314
Medium	Light	1	6.9	--	6.9	135	25 16%	160	110	--	110	75	55 42%	130
Medium	Medium	11	6.4	0.1 2%	6.5	311	180 37%	491	205	11 5%	216	205	30 13%	235
Medium	Heavy	5	9.8	0.7 7%	10.5	57	27 32%	84	82	11 12%	93	147	2 1%	149
	Total	42	7.5	0.2 3%	7.7	144	71 33%	215	123	10 8%	133	184	30 14%	214

Recommendations

Recommendations have been made in separate reports (2, 3) for the alleviation of the jack-pine budworm outbreak on the Huron National Forest. These recommendations include the promotion of salvage cutting activities in areas of most severe budworm defoliation and the removal of suppressed and orchard type jack pine conducive to the build-up of budworm populations. Ecological studies designed to determine the habits of the budworm and inquiry into the possibilities of employing parasites and predators in the control of the budworm were also suggested.

It is recommended that the timber drain survey be repeated in 1952 to obtain a forest-wide picture of the budworm situation, and that the permanent study plots be reexamined to determine the losses over a long term.

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